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Maize-based Agricultural Ecosystems US-Ne1, US-Ne2, US-Ne3

Andy Suyker

Ameriflux Data Managers Workshop
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University of Nebraska–Lincoln

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Funding Agencies:

DOE OBER

NASA

UNL

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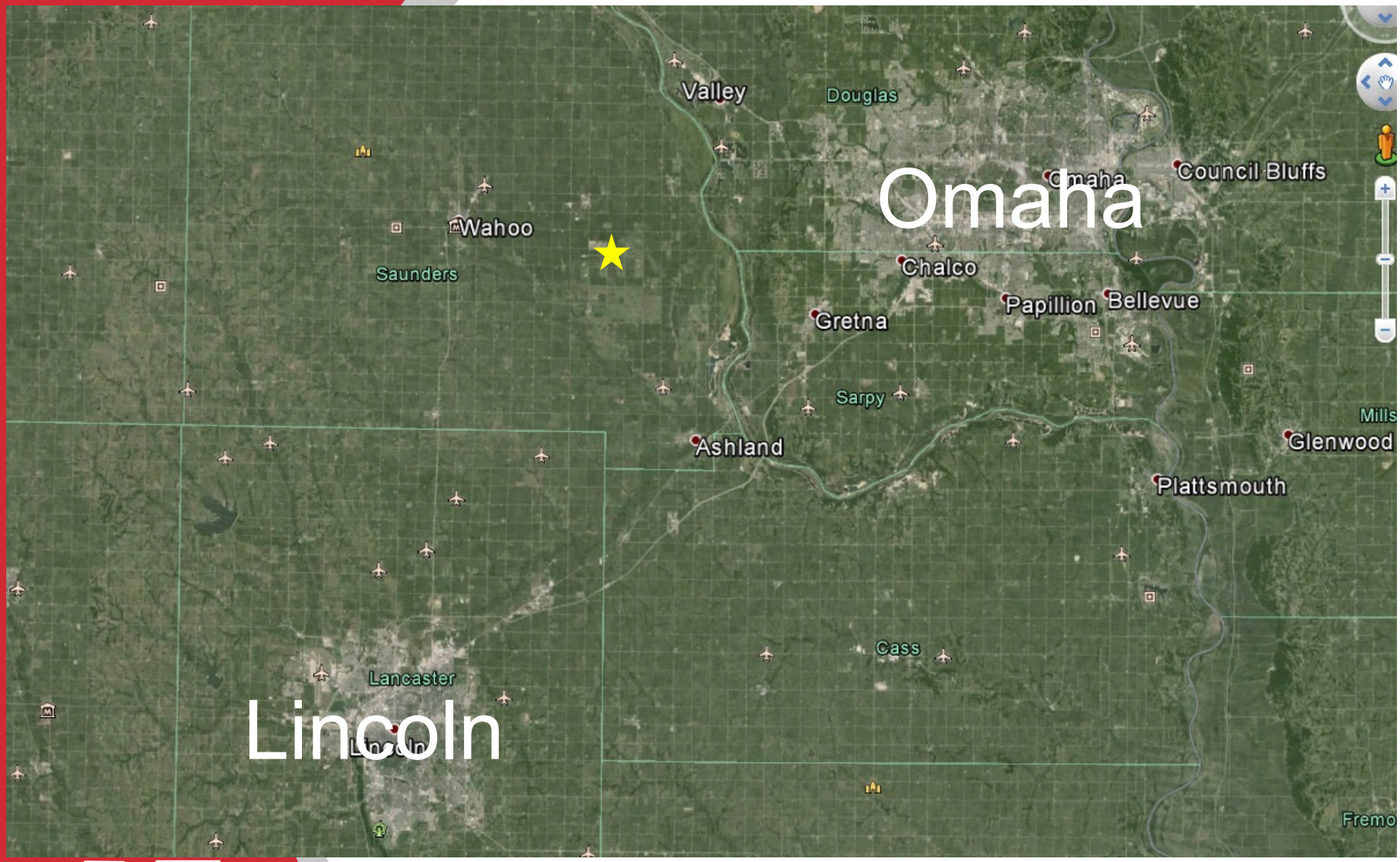

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Google Earth 4/9/2013

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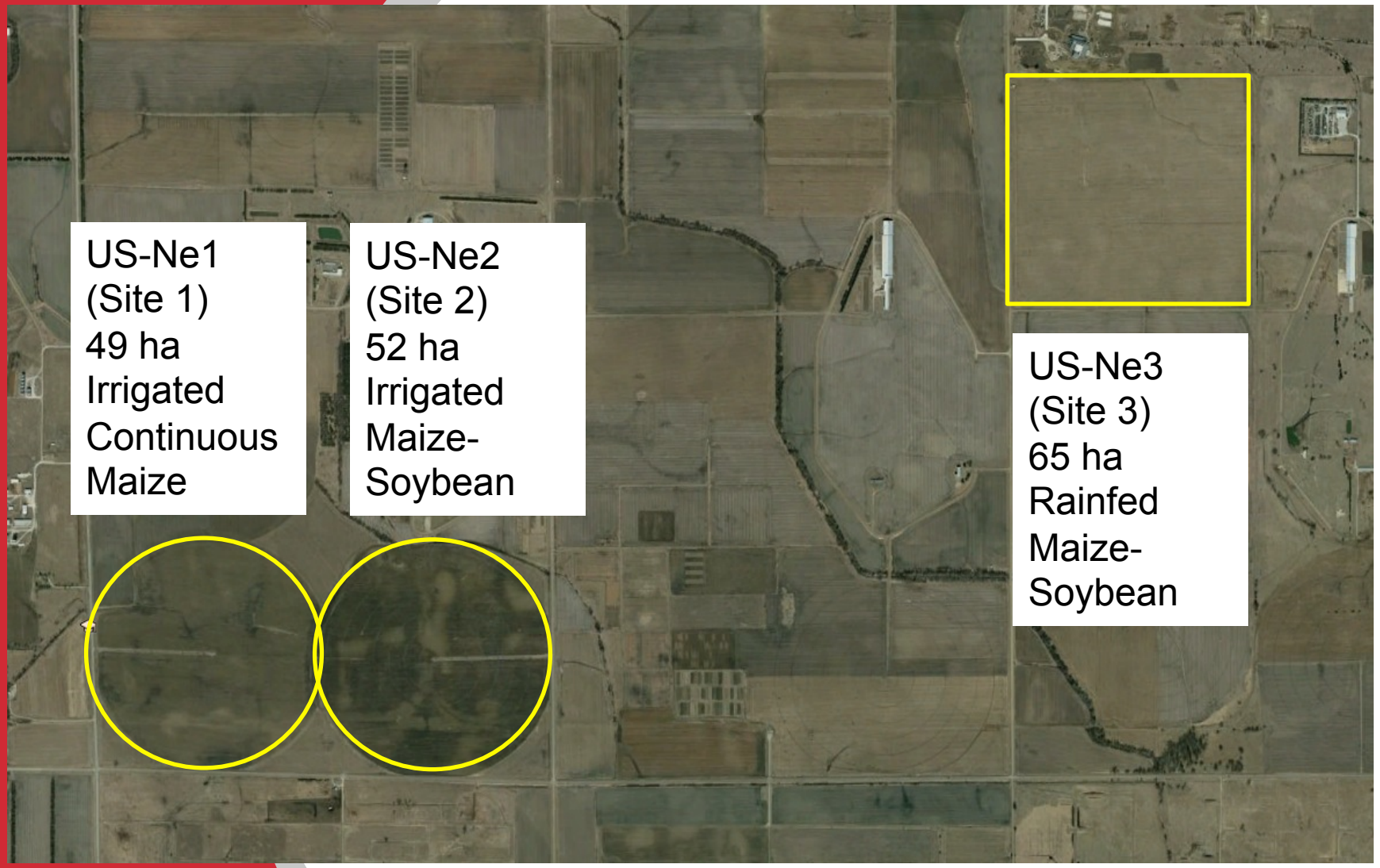

Google Earth 3/7/2012

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c/o Delores Pittman

Fluxes:
F_c - CO_2 flux
ET – evapotranspiration
H – sensible heat flux

Environmental parameters:
CO_2 conc. profile
Precipitation
Windspeed
Air temperature
Humidity
Soil heat flux
Soil temperature
Soil moisture

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Radiative Fluxes:

Net Radiation

Incident/reflected PAR

Incident/ reflected solar

Diffuse PAR

Absorbed PAR

Multispectral band reflectance

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Biological Parameters

Data collected from intensive measurement zones (IMZ)'s representative of soil classes distributed across the field

Total/green leaf area (destructive)
Above ground biomass (dry and fresh)
Grain/cob/husk biomass
Surface Residue removed

Other Parameters
Leaf gas exchange
N_2O and CH_4 and soil surface CO_2 flux (chambers)
Decomposition studies

Research Components

Tower eddy covariance fluxes of CO_2, water vapor and energy: *Shashi Verma, Andy Suyker*

Monitoring and mapping soil C stocks: *Dan Walters*

Litter decomposition: *Jean Knops*

Above biomass and leaf area index: *Timothy Arkebauer*

Leaf gas exchange: *Timothy Arkebauer*

Soil surface fluxes of CO_2, N_2O and CH_4: *Timothy Arkebauer*

Belowground processes: *Dan Walters*

Monitoring soil water: *Ken Hubbard*

Ecosystem modeling: *Haishun Yang, Ken Cassman*

Remote sensing: *Anatoly Gitelson, Betty Walter-Shea*

Life Cycle Analyses: *Adam Liska*

Management Practices

	Planting density (plants/ha)	Fertilization	Tillage
Site 1	~80,000 maize	Spring UAN Fertigation	Conservation tillage after 2005
Site 2	~80,000 maize (odd years)	Spring UAN Fertigation	Conservation tillage after 2010
	Continuous maize beginning 2010 w biomass removal		
	~300,000 soybean (even years)		
Site 3	~55,000 maize (odd years)	Spring UAN	Strictly no till
	~300,000 soybean (even years)		

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2nd Generation Biofuel Biomass Removal Project from 2010-2013 at Site 2

Irrigated maize-soybean converted to irrigated continuous maize (with conservation tillage)

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Severe Hailstorm September 15, 2010

Site 1:
Yield was 16% of estimated value

Site 2:
Yield was 50% of estimated value

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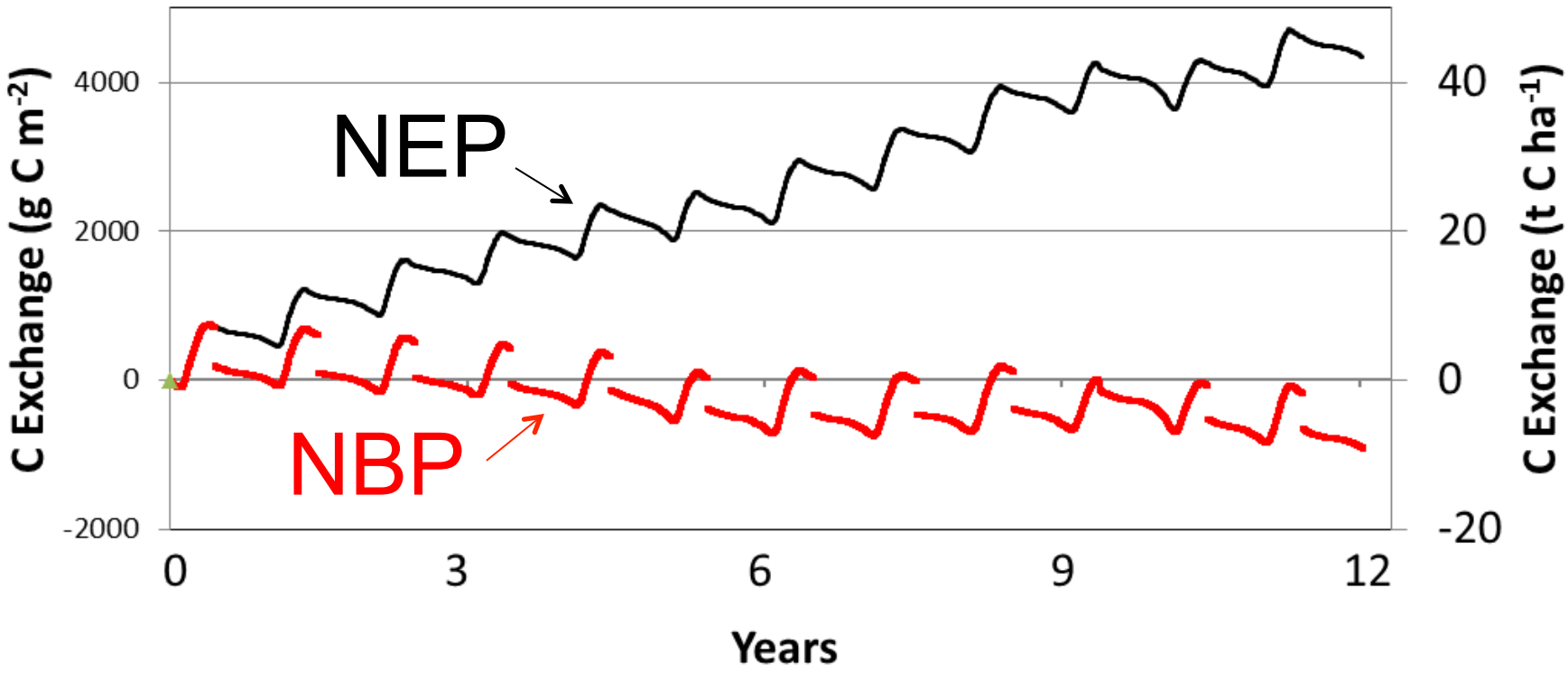
Site 1 Irrigated Continuous Maize



$$NBP = NEP - C_g$$

$$= 43.1 - 52.5$$

$$= -9.4 \text{ t C ha}^{-1}$$

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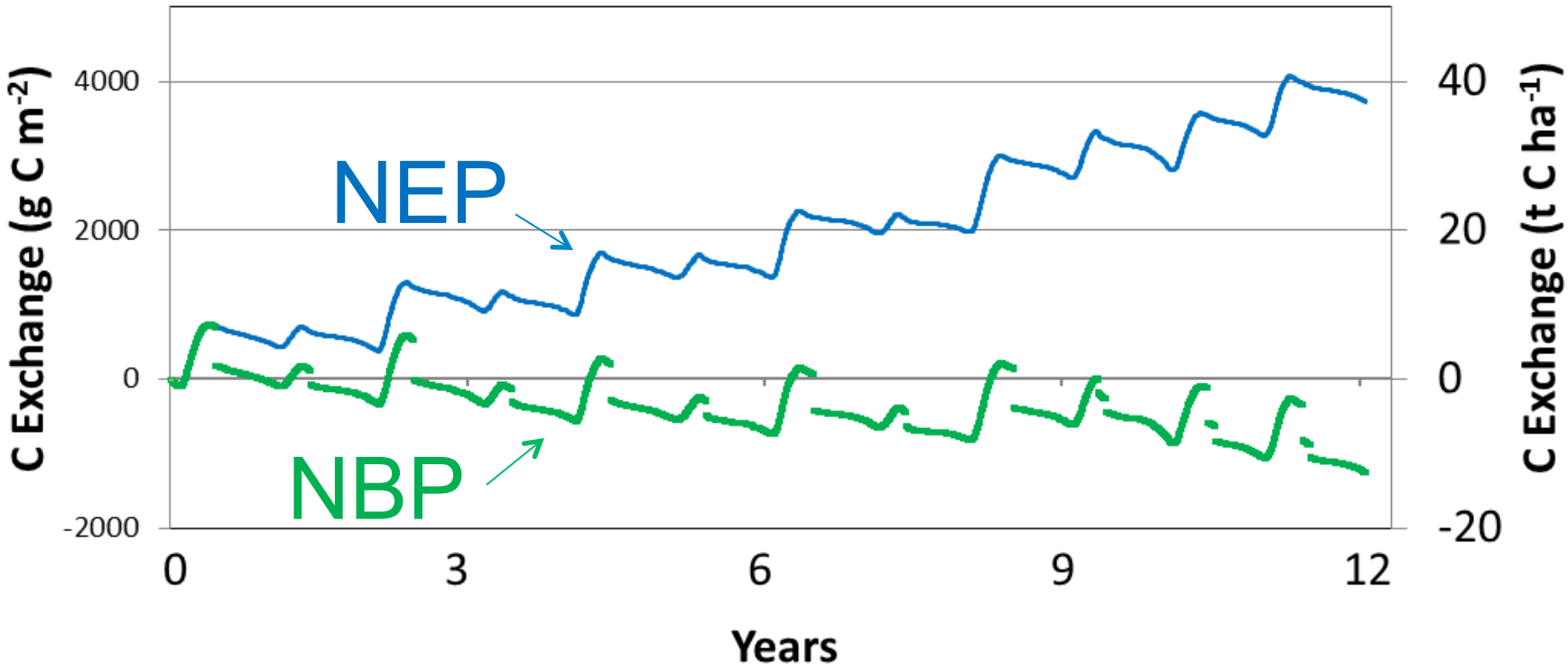
Site 2 Irrigated Maize-Soybean



$$NBP = NEP - C_g - R_s$$

$$= 37.3 - 44.3 - 5.5$$

$$= -12.5 \text{ t C ha}^{-1}$$

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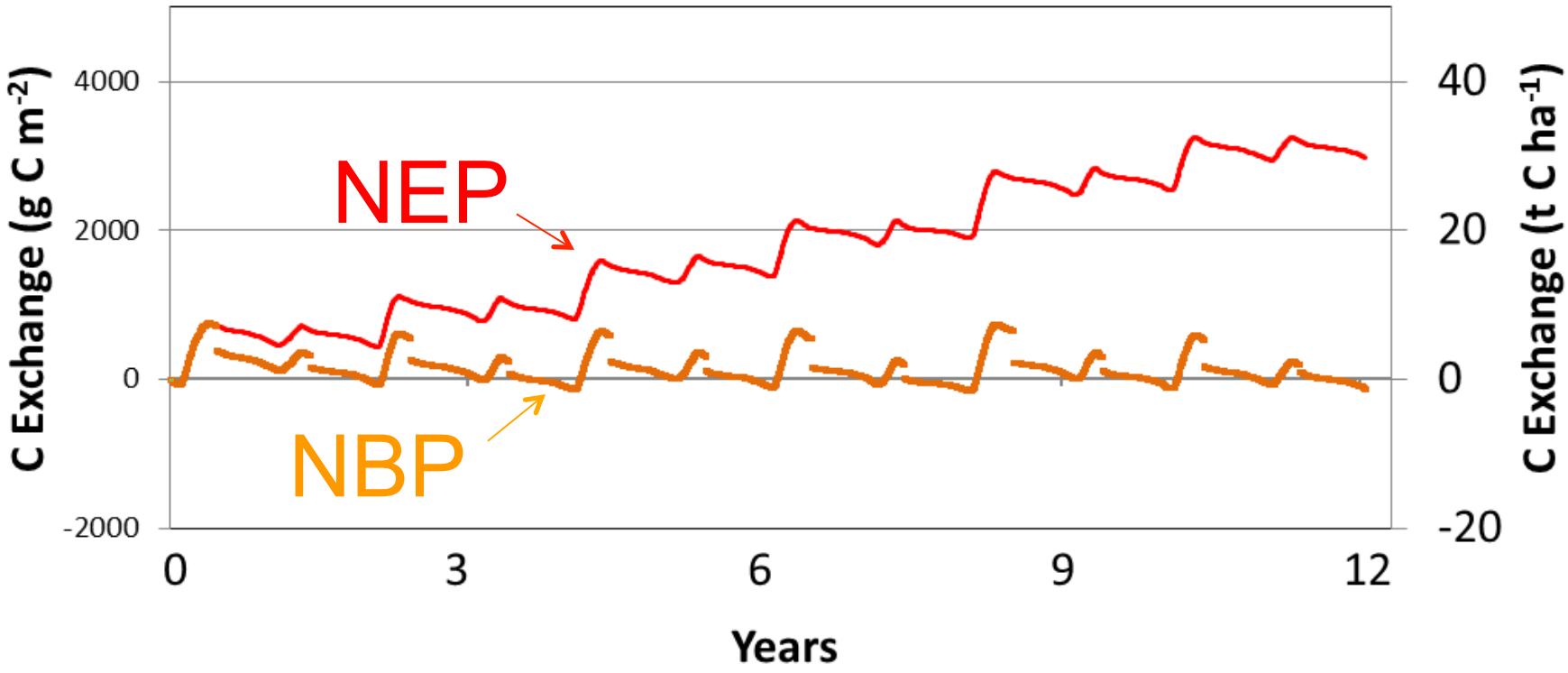
Site 3 Rainfed Maize-Soybean



$$NBP = NEP - C_g$$

$$= 29.7 - 31.0$$

$$= -1.3 \text{ t C ha}^{-1}$$

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Data Processing:

Hour long block averaging periods

Frequency response corrections including tube attenuation (Moore, 1986; Massman, 1991)

Angle of Attack (Nakai et al., 2006)

Stationarity (Foken et al., 2004) and other quality control flags (skewness, kurtosis, standard deviation)

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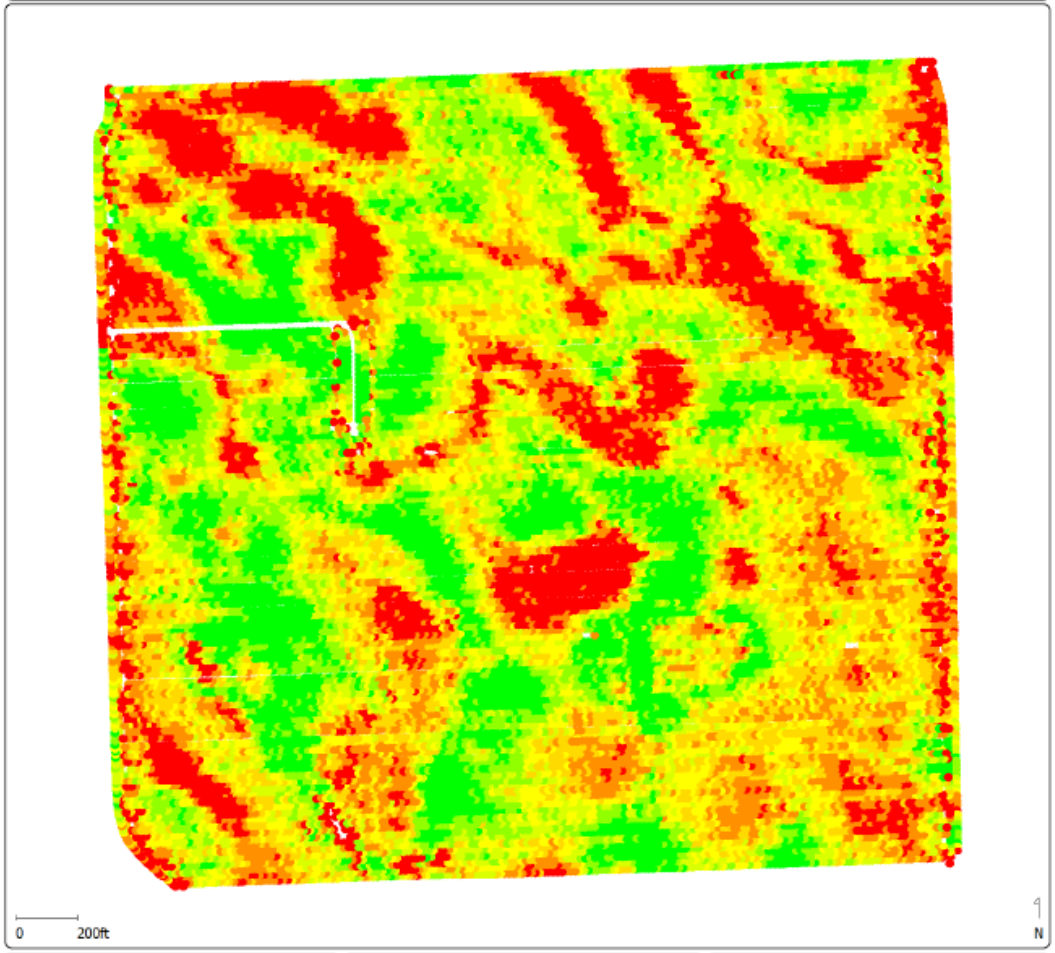
CSP3

Grain Harvest 2012 - 4.93(SOYBEANS)



Grower : University of Nebraska
Farm : Farm Operations
Field : 4.93
Year : 2012
Operation : Grain Harvest
Crop / Product : SOYBEANS
Op. Instance : Harvest - 1
Area : 161.95 ac
Avg. Yield : 31.83 bu/ac
Avg. Moisture : 8.607 %

Estimated Volume (Dry)
(bu/ac)

41.76	64.67	(22.98 ac)
36.75	41.76	(23.17 ac)
33.29	36.75	(23.20 ac)
30.23	33.29	(23.21 ac)
26.87	30.23	(23.19 ac)
21.87	26.87	(23.15 ac)
5.07	21.87	(23.06 ac)